

United States
Department of
Agriculture

Forest
Service

Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370-5909

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Route To:

Subject: Pine Reproduction Weevil Survey, Calaveras RD
(FPM Report C98-1).

To: District Ranger, Calaveras RD

In early April, 1998, Calaveras RD personnel observed mortality in a four year-old ponderosa pine plantation (Unit 0170031). They initially attributed the mortality to attack by the pine reproduction weevil and also noted apparent herbicide damage throughout the plantation. The site was visited on April 8 by Joy Barney, Groveland RD and Jim Junette, Greg Casselberry, Dave Vosti, Ron Friend and Jim Newman of the Calaveras RD. They confirmed that the pine reproduction weevil, Cylindrocopturus eatoni (see attached Biology) was involved with most of the mortality.

The pine reproduction weevil (PRW) is currently associated with significant levels of mortality over approximately 2,000 to 3,000 acres of pine plantations on the Groveland RD and PRW infestations have recently been detected on the Mariposa RD, Sierra NF. There was concern that a similar situation was developing on the Calaveras RD and that the herbicide damage was predisposing the pines to attack by PRW. The unit was evaluated on April 23 by John Wenz, Forest Pest Management (FPM) entomologist, Joy Barney and Jim Junette.

Unit 0170031 (Unit "31") was planted in 1994 as part of efforts to regenerate the August, 1992, 17,386 acre, Old Gulch wildfire. It covers 30 acres in the Manuel Compartment (#017) at an elevation of 3,200 feet. The plantation was hand treated with herbicides (glyphosate-triclopyr) in May, 1997 and was interplanted in March, 1998. Both 1996-97 generation and current, 1997-98 generation, PRW-related mortality was observed in Unit 31. The mortality was not scattered throughout the plantation but was generally restricted to the upper slope of the eastern edge of the plantation and to areas of the unit containing bear clover. Most of the pines with PRW were suppressed, had reduced height growth compared to most of the growing stock and many were J-rooted. Pine reproduction weevils were also found infesting the distal four to six inches of the leader and some lateral branches of a few herbicide damaged trees. The PRW-infested parts of the terminals were dead but the rest of the trees, below the infested areas, were alive.

Small groups of PRW-related mortality were also observed in regeneration on the ridgetop just outside the eastern edge of plantation. In addition, scattered

PRW-related mortality was found in Unit 30, adjacent to Unit 31 on the east side of the ridge. Unit 30 was planted in 1993 and covers 16 acres. The PRW-related mortality in Unit 30 was concentrated in small, poorly growing, suppressed pines. PRW-related mortality was also present in Unit 32 immediately adjacent to Unit 31 on the west side of the plantation. Unit 32 was planted in 1993 and covers eight acres. It currently has moderate to heavy concentrations of brush including greenleaf manzanita, buck brush, golden fleece and bear clover. Neither Unit 30 or 32 was treated with herbicides in 1997. Surveys of the 225 acres treated with glyphosate-triclopyr in May, 1997, conducted by the Calaveras RD, did not find PRW-related mortality in any unit other than Unit 31.

The current PRW-related mortality appears to involve less than 5% of the 1994 planted stock in Unit 31 and is largely associated with poorly growing, suppressed trees. This is also the case for the PRW mortality in Units 30 and 32 where the PRW infested trees appeared stressed by poor root development (J-roots) and brush competition. The trees attacked by PRW between mid-April and July, 1997 may also have been under some moisture stress due to the extremely dry spring and early summer of 1997. This is consistent with past outbreaks and with observations of the current outbreak on the Groveland RD where it appears that most of the PRW infestation occurs in units suffering from brush competition.

The surveys did not find the currently infested PRW trees distributed throughout Unit 31 in association with the herbicide damage. Some PRW-related mortality was present prior to the 1997 herbicide application and PRW-related mortality was found in Units 30 and 32 which were not treated with herbicides in 1997 as well as in regeneration on the ridgetop outside eastern edge of the Unit 31. At this point, it does not appear that the herbicide damage in Unit 31 initiated much increase in 1997 PRW activity; PRW attacks in herbicide damaged pines were mostly restricted to the distal portions of the leaders and/or lateral branches and has not resulted in tree mortality.

Control of existing PRW infestations involves the removal and destruction currently infested trees prior to the emergence of the next generation adults. Although this does not preclude subsequent migration of adults into the treated areas from nearby untreated areas, it will reduce PRW populations within the treated areas and potentially reduce the number of trees infested by the next generation. Studies are underway on the Groveland RD to assess the efficacy of this treatment. As of April 23, the weevils in Unit 31 and the surrounding units were still in the overwintering larval stage. Depending primarily on weather, adult emergence may begin in 3 to 4 weeks or about 2 weeks after the onset of pupation.

Removal and destruction of the trees currently infested with PRW in Unit 31 and adjacent areas (including Units 30 & 32) while mortality/populations are still relatively low, provides the best chance to prevent a build-up of PRW

populations and subsequent mortality to both the older regeneration and the 1998 interplanted stock. Regardless of any actions taken or not taken, these units should be monitored in the fall of 1998 and the spring of 1999 to assess mortality and the survival of herbicide damaged trees.

A handwritten signature in cursive script, reading "John M. Wenz".

John M. Wenz
Entomologist, FPM
South Sierra Shared Service Area

BIOLOGY

Pine Reproduction Weevil Cylindrocopturus eatoni (Coleoptera: Curculionidae)

The pine reproduction weevil (PRW), is a native insect that became of interest in the early 1940's when it was found to be destructive to pine plantations established to reforest brushfields in northern California. It has subsequently been a periodic problem in pine plantations below about 4,500 feet in elevation in northern and central California. It's range may extend into Oregon and southern California. Ponderosa pine is the primary host although it sometimes attacks sugar and foothill (gray) pines. Jeffrey pine may also be attacked when planted within the range of ponderosa pine.

The PRW completes a life cycle in one year. The grayish appearing adults (2.5 mm in length) emerge from infested trees from late-April to mid-July. They feed on pine foliage, twigs and stems for about two to three weeks. The feeding punctures leave concentric brown rings about 1 mm in diameter on the needles and small pitch globules on the twigs and stems. Adult females lay eggs, singly, in feeding punctures on the main stem and/or laterals below the current year's growth. The eggs hatch in about two weeks. The cream colored, legless, larvae bore into the cambium-phloem area where they feed until fall when they construct pupal chambers in the outer layers of the wood or in the pith of smaller diameter stems. The principal damage to the host pine is the destruction of the cambium-phloem area resulting from larval feeding. The larvae generally tunnel in the above ground woody portions of the tree but infestations often extend into the roots two to three inches below the soil surface. The PRW overwinters as mature larvae (about 4 mm in length) in the pupal chambers. Pupation occurs the following spring. The pupal stage lasts about two to four weeks after which the next-generation adults emerge leaving emergence holes in the bark.

Attack is usually restricted to pines between about 18 inches to 5 feet in height although trees 8 inches up to about 10 feet in height can be infested. Infested trees become evident starting in late-summer and fall when the foliage begins to fade from the top down. The foliage becomes progressively straw colored and chlorotic and by the following spring is usually reddish brown. Sometimes only the upper part of the tree is attacked and killed and, with taller reproduction, only laterals may be attacked. In both cases, such trees are often re-attacked and killed the following year. The wood in areas of the stem/laterals attacked by PRW is often discolored by wood-staining fungi.

The natural enemy complex of the PRW has not been well studied but nine species of Hymenopterous parasitoids and one predaceous clerid beetle have been reared from PRW infested hosts and may play an important role in regulating PRW populations. Most problems with PRW have occurred in plantations under stress from one or a combination of factors including competing vegetation, poor planting practices (J/ L-roots), use of stock poorly adapted to the site and/or soil moisture stress. Under such conditions, infestations can persist for several years and destroy a large proportion of the plantation. Maintaining suitable growing conditions in plantations is the most effective means to prevent PRW impacts.